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A new and simple method by which cautery-irons may be electrically heated almost instantaneously.

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A NEW AND SIMPLE METHOD BY WHICH CAUTERY-IRONS MAY BE ELECTRICALLY HEATED ALMOST INSTANTANEOUSLY.[1]

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WHILE at the World's Fair I was much interested by a new method of heating metals by electricity, the novelty consisting not only in the rapidity with which the metals were heated, but also in the peculiar method of applying electricity for this purpose. The metal, such as, for instance, a soldering-iron, was dipped into a bucket or jar containing a watery solution of borax and sodium carbonate, and in a few seconds became red-hot. A large, flat iron file, held in the solution, rapidly became white-hot, the heated metal standing out in brilliant contrast with the water; if the file was kept still longer in the solution it commenced to fuse rapidly.

A closer inspection showed that the bucket or jar was connected with the terminals of a 230-volt Edison current, the positive wire being attached to a plate of lead at the bottom of the jar, and the negative wire passing across the top of the jar. When used, the bar of metal was placed in contact with the negative wire, and the part to be heated was dipped into the solution, the heating process, as stated, taking place with remarkable rapidity.

[1] Read before the Orleans Parish Medical Society, April, 1895.

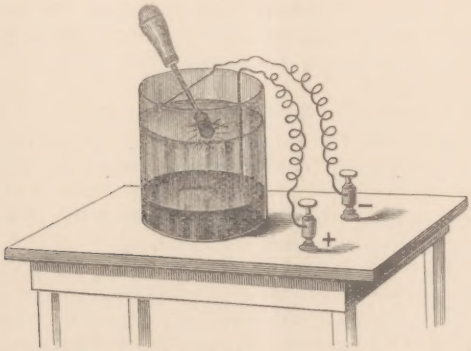
It occurred to me that this method might be adapted to the heating of iron cauteries, which are still heated by the slow and cumbersome method of the charcoal-furnace or the blow-pipe oil-lamps. The heating of the ordinary platinum electro-cauteries leaves little to be desired, but this method is adapted only to the smaller cauteries, and cannot be used for the larger cautery-irons.

A series of experiments which I made with this method of heating cautery-irons has convinced me that it is not only simple and effective, but also quite economical. As a result of these experiments, I find that the average current required is 15 ampères at 230 volts, and the average time for heating the cauteries three seconds. The cost of each heating, as estimated for me by Mr. Coleman Reed, of the Louisiana Electric-Light Company, was about one-twelfth of a cent for one heating.

The apparatus is exceedingly simple. The vessel that I use is the jar of an ordinary bluestone battery, but any glass jar with a capacity of one or two quarts will answer the purpose. The jar is filled three-quarters with a solution of borax, 1 part; sodium carbonate, 10 parts; water, sufficient to make a density of 1.060.

A plate of lead, one inch wide, is coiled around the bottom of the jar, and to this is soldered the positive terminal. The negative wire is passed across the top of the jar, as shown in the accompanying illustration, and the apparatus is complete. The wires should connect with the Edison current-system of 230 volts, which is available in most cities in the United States and Europe. The ordinary cautery-irons may be used, the wooden or hard-rubber handles affording all the insulation that is required for the hand. It will be noted that I first place the neck of the cautery in contact with the upper (negative) wire, then as the point or knob of the cautery touches the solution it immediately becomes red-hot, and, if left longer in the solution, white-hot. To one

who has never seen this method used before, the metal becoming heated on being immersed in a watery solution, and showing its brilliant incandescence through the water, the effect is very astonishing.



When we investigate the cause of the heating effect the theory that it is due to the resistance of the metal, as in the ordinary platinum electro-cauteries, will not explain the effect in this case. Fifteen ampères at 230 volts for three seconds would certainly not heat this large cautery perceptibly ; and if it were a question of the resistance of the metal, it would become heated at the neck, where the resistance is greater, instead of at the large, rounded part.

The passage of the current through the iron no doubt has a slight heating effect, but the intense heat generated is due to another cause. When the electric current is passed through the solution electrolysis is set up, oxygen being liberated from the lead plate (positive terminal) and hydrogen from the immersed instrument, which is in contact with the negative terminal. This thin layer of hydrogen has a very high resistance, and at once becomes intensely hot and communicates its heat to the

metallic instrument. The great heat of the hydrogen causes it to combine with the oxygen of the air, and this combustion adds to the heat of the cautery.

In experimenting with various metals for this process I find that the ordinary cautery-irons, as sold by instrument-makers, will answer every purpose. If made of copper, however, a somewhat longer time is required to heat them, but they will retain their heat for a longer period of time.

While the cautery-irons belong to the domain of general surgery, still I have found it serviceable to keep certain ones on hand. Quite recently I found this method of heatiug a cautery-iron useful in controlling an alarming hemorrhage after tonsillotomy, which the Paquelin thermo-cautery had failed to control.

As most hospitals and offices are supplied with the Edison current for illuminating purposes, this apparatus may be introduced with but little expense. The advantages of the method are its simplicity, reliability, and economy.

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